

Adapted from

***How Children Learn Number Concepts: A Guide to the Critical Learning Phases* by Kathy Richardson**

Critical Learning Phase	Description
Counts one item for each number word (one-to-one correspondence) <i>Children who understand this Critical Learning Phase touch one counter each time they say a number.</i>	Students begin by “acting out” counting and pointing at objects while saying the counting sequence. Once students understand that they touch just one object for each counting number, they may still not be able to do this for all numbers. They may have one-to-one correspondence for smaller numbers and still lose track when counting larger quantities.
Keeps track of an unorganized pile <i>Children who understand this Critical Learning Phase consistently touch each item once and only once when they count.</i>	Knowing that they say one number for each object does not ensure that students can keep track and count each object only once. They may not pay attention or notice if they have touched an object more than once or missed it. Students develop ways to keep track and are consistent with objects that can be moved and those that cannot (pictures). This is not an easy task for beginning counters; they need lots of practice.
Notices when recounting a group results in a different number Is bothered when counting a group results in the same number after some have been added or taken away <i>Children who understand these Critical Learning Phases react if it doesn't make sense to end up with the number they did when they counted.</i>	When children do not understand why keeping track of the amount matters, they may not be concerned when they get a different amount when they count the same group of objects. Teachers need to observe students in different settings to see how they handle situations like these when they are not accurate.
Spontaneously checks by recounting to see if the result is the same <i>Children who understand this Critical Learning Phase pay attention to what they counted and spontaneously double-check to make sure they land on the same number again.</i>	As students develop a deeper understanding and recognize they should get the same number every time they count the same group of objects, they will spontaneously check to see if they come up with the same number. This is not the same as rechecking because they have been prompted to do so.

<p>Knows “how many” after counting</p> <p><i>Children who understand this Critical Learning Phase respond to the question “how many?” with the number they landed on when they counted, without needing to recount to find out.</i></p>	<p>Students move through stages in developing an awareness of quantity. Initially they may not know how many they counted right after finishing counting; this shows they focused on counting and not on the actual quantity. To answer the question of “how many?” they may guess, say they don’t know, or recount. When students know “how many?” when they count, they are aware of the purpose of counting.</p>
<p>Counts out a particular quantity</p> <p><i>Children who understand this Critical Learning Phase can easily and consistently count out a particular quantity.</i></p>	<p>This is a completely different process than counting a set of objects. There are two different situations. One is to get a specific number of objects, and the other is to determine the number of objects needed and then get the number of objects. To count out a quantity, students must hold a number in their head while they count. Students move through stages-- they count past the number asked for; next, they remember the number when they get to it in the counting sequence, and may self-correct and start over. When getting the undetermined number (the second situation) students may think about getting one for each person without actually thinking about the total amount at once.</p>
<p>Reacts to estimate when counting</p> <p><i>Children who understand this Critical Learning Phase realize when they have counted past or won’t reach their estimate. This is not an expectation for young children, but is worth noting when a child has reached this level of awareness. It is also a reminder that learning to count involves more than getting the right answer.</i></p>	<p>This phase isn’t as much about estimating as it is about students thinking about what they are counting in relationship to their estimate. When students can think about what they are finding out as they count, they react or comment about their estimate.</p>
<p>Spontaneously adjusts estimate while counting and makes a closer estimate</p> <p><i>Children who understand this Critical Learning Phase change their mind and make a closer estimate while they are counting because they have more information on which to base their estimate.</i></p>	<p>In the beginning stages of counting, numbers are too new of a concept to students to make adjustments to an estimate while counting. It is difficult for them to even comprehend an estimate that makes sense to the amount they are counting. Typically students will begin to recognize making an adjustment to an estimate with very small numbers first. With increased experience with larger numbers and number relationships, students will begin to make more reasonable estimates and make adjustments to those estimates while counting.</p>

<p>Knows one more in sequence without counting</p> <p><i>Children who understand this Critical Learning Phase trust they know how many without counting and know the required number in the one more number sequence.</i></p>	<p>In the beginning stages of counting, students do not know enough or trust their early understandings of numbers to realize they could know how many there will be without counting.</p> <p>When students begin to realize that one more is the same as “what number comes next,” they can start to trust that the number of objects can be determined without counting.</p> <p>The more familiar students are with the counting sequences, the more successful they will be with knowing one more in sequence without counting.</p>
<p>Knows one less in sequence without counting</p> <p><i>Children who understand this Critical Learning Phase trust they know how many without counting and know the required number in the one less number sequence.</i></p>	<p>While one more and one less are tied to knowing the counting sequence, it is much more difficult for students to reason about the concept of less. Even when it is only one less. It is harder for students to think about what comes before than what comes next.</p> <p>The one less sequence requires students to know the count sequence both forward and backward. This understanding comes with time and experience. Many times students can determine one less in sequence without counting for ranges below 5, but they will need many experiences to make sense of the sequence for larger numbers.</p>
<p>Notices if a counting pattern doesn't make sense</p> <p><i>Children who understand this Critical Learning Phase catch themselves if they slip into a number pattern that doesn't work for the situation. It is not an expectation for the youngest children just learning about numbers to notice this, but it is necessary for children to eventually reach this level of understanding if they are going to make sense of what they are learning.</i></p>	<p>One cannot assume that numbers are meaningful to students just because they know one more or one less in sequence without counting. However, we can tell if students are not realizing the meaning of numbers if they do not realize when they are counting and have made an error in the counting pattern.</p> <p>Examples of this could be counting <u>back</u> from 13 and saying 13, 14, 15; or counting up from 20 and saying 20, 30, 40.</p> <p>It is typical for a student in the beginning stages of learning to count to make these kinds of errors. However, it is necessary for the student to notice if the counting pattern doesn't make sense as they gain more experience with counting and number relationships.</p>
<p>Knows one more without counting when numbers are presented out of sequence</p> <p><i>Children who understand this Critical Learning Phase can say what number is one more than any other number within the range of numbers they are working with.</i></p>	<p>Once students are more familiar with the counting sequence, they need to be able to determine one more without counting from any number. Students in the beginning stages of counting will typically recount from one to determine one more. Over time and with more experience, students become more familiar with numbers and their relationships and know one more for any number without counting.</p>

<p>Knows one less without counting when numbers are presented out of sequence</p> <p><i>Children who understand this Critical Learning Phase can say what number is one less than any other number within the range of numbers they are working with.</i></p>	<p>Similarly, as students become more familiar with the counting sequence they will be able to determine how many will be left when one is taken away from any number. In the beginning stages of counting, to determine one less, students will count from one up to the number. Over time and with more experience, students become more familiar with numbers and their relationships and know one less for any number without counting.</p>
<p>Counts by groups by moving the appropriate group of counters</p> <p><i>Children who understand this Critical Learning Phase form the groups as they go, using counting by groups as a shortcut for counting by 1s.</i></p>	<p>While it is common for young students to learn to skip count (count by 2s, 5s, 10s, etc), it is often done through oral counting. When students are not given the opportunity to make connections between counting objects and skip counting, they are often confused by the purpose for learning a skip counting sequence. Many students show their confusion by counting a group of objects and touching one object at a time saying, "2, 4, 6, 8..." With practice of using groups of objects to count, students will often arrange the objects into the group size being counted prior to counting. For example, to count by twos, the student arranges all of the objects into groups of two first. This helps the student to visualize the groups of 2 and they often point to each group as they count. This is an important step toward counting groups of objects. The goal is for students to approach a group of objects and pull aside the desired group size as they count.</p>
<p>Knows quantity stays the same when counted by different-sized groups</p> <p><i>Children who understand this Critical Learning Phase know the quantity stays the same no matter how a group of objects is counted.</i></p>	<p>Conservation is a Piagetian stage educators are familiar with. Younger students often think that a group of objects that has been counted by ones will have a different number of objects if it is counted by 2s or 5s etc. With many experiences in counting and more familiarity with number relationships, students come to realize that the number of objects in a group remains the same no matter how they are counted.</p>